

Amendment and Response - -

Serial No.: 09/345,335

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Confirmation No.: Unknown

Filed: July 1, 1999

For: PROCESS VARIABLE GENERALIZED GRAPHICAL DEVICE DISPLAY AND METHODS REGARDING SAME

The 35 U.S.C. '103 Rejection

Claims 1, 3-5, 7-13, 15-17, 19, 21, 23-25, 27-33, 35-38, 40-41, and 43-51

The Examiner rejected claims 1, 3-5, 7-13, 15-17, 19, 21, 23-25, 27-33, 35-38, 40-41, and 43-51 under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 4,675,147 to Schaefer *et al.* (hereinafter "Schaefer") in view of U.S. Patent No. 5,375,199 to Harrow *et al.* (hereinafter "Harrow"). Applicants respectfully traverse the rejection of the claims, as follows.

In each of independent claims 1, 21, 40, 43, 47, and 51, Applicants teach a computer implemented graphical user display and/or method for providing real-time process information to a user for a process that is operable under control of one or more process variables. The one or more process variables include high and low process limit values associated therewith. The graphical user display includes one or more graphical devices, where each graphical device corresponds to a process variable. The graphical device for a corresponding process variable includes a display of a gauge axis and a first and second pair of high and low elements. The first pair of high and low limit elements are representative of engineering hard high and low limit values for the corresponding process variable. The second pair of high and low limit elements are representative of operator set high and low limit values for the corresponding process variable, where the first and second pair of high and low limit elements are displayed on the gauge axis. A graphical shape is displayed along the gauge axis representative of a value of the corresponding process variable relative to the process limit values.

The terms used in the claims must be read as defined in the specification. For example, the following description is given for various "limit" terms:

As used herein, engineering physical limit values refer to limit values that define the physical limits of a piece of equipment or instrumentation. They represent the widest possible range of meaningful quantification of a process

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variable. For example, there may be engineering physical limits to measurements that a sensor may be able to provide.

As used herein, engineering hard limit values are those limit values set by a user, particularly a control engineer, to establish a range over which an operator or another user can safely set operator set limit values.

As used herein, operator set limit values are limit values through which operators exert influence on the controller 14. Such limits establish the range in which the control solution is free to act when it is afforded sufficient degrees of freedom.

Lastly, as used herein, optimization soft limits, or otherwise referred to herein as delta soft bands, are pseudo limits describing an offset within the operator set limits that the optimization calculations will attempt to respect.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations.

First, applicants respectfully submit that Schaefer and Harrow fail to teach or suggest all the claim limitations of the independent claims 1, 21, 40, 43, 47, and 51. For example, Schaefer and Harrow fail to teach or suggest displaying a first pair of high and low limit elements representative of engineering hard high and low limit values for the corresponding process variable and a second pair of high and low limit elements representative of operator set high and low limit values for the corresponding process variable, as recited in each of such claims.

Schaefer provides an integrated graphic display. Values of operating parameters are indicated by locating the vertices of a polygon relative to a fixed distance on an appropriate scale determined by the current values of reference signals and limit signals. In other words, real time actual values of the operating parameters are plotted

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on the graphical display for monitoring the safety status of the plant. Such values of parameters are dynamically scaled between the reference value and high and low limits which are displayed as tic marks at fixed distances along spokes radiating from a common origin and passing through the vertices. The Examiner alleges that such high and low limits represented by the tic marks are equivalent to the engineering hard limits described in the claims. The Examiner recognizes that Schaefer does not show a second pair of high and low limit elements representative of operator set high and low limit values. However, the Examiner relies on Harrow to provide such elements.

Harrow recites a system monitoring device that displays historical or real time information and also allows a user to set, via direct manipulation, a range of values for use by the system. For example, a user interface allows the user to expand the value of an interactive icon 200. The exemplary interactive icon 200 is illustrated in its expanded state on the graph in FIG. 13A where the user can move the range of values along the y-axis by dragging the slider 202 of the interactive icon 200 to change values associated with the interactive icon 200. Harrow indicates that the interactive icon 200 . . . allows a user to set a range of values in relationship to graphically presented data. (Col. 17, line 68 – Col. 18, line 2). In its default condition, the indicator bar 204 of the interactive icon supplies a single crossing threshold represented by a thin line (Col. 18, lines 12-16) for a variable (i.e., CRC errors per hour). Thus, the indicator bar 204 provides a single limit value for a particular variable, i.e., CRC errors per hour.

According to Harrow, a user can expand the value of the interactive icon 200 (i.e., the indicator bar 204) into a range of values so that the single limit value for the variable (i.e., CRC errors per hour) is a range designated for control of an alarm. For example, 206 in Figure 13A of Harrow indicates that "46" is the value at which "SOUND ALARM WHEN VALUE RISES ABOVE", and 208 in Figure 13A indicates that "26" is the value at which "CANCEL ALARM WHEN VALUE FALLS BELOW". As such, the values

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shown at 206 and 208 of Harrow represent an expanded range of values for a single operator limit value used to provide alarm function. In other words, Harrow provides an alarm range at the upper operator limit for the variable being monitored (e.g., CRC errors per hour). Harrow does not show "operator set high and low limit values."

Contrary to Harrow, the present invention provides the second pair of high and low limit elements representative of operator set high and low limit values. As defined in the specification, such operator set limit values are limit values through which operators exert influence on the controller. Such limits establish the range in which the control solution is free to act when it is afforded sufficient degrees of freedom. The operator set limit values fall within a range established by the engineering hard limit values. In other words, the engineering hard limit values are those limit values set by a user, particularly a control engineer, to establish a range over which an operator or another user can safely set operator set limit values.

The limits discussed in Harrow are clearly only focused on a single operator limit (i.e., a high limit designated as line 204) for a variable (e.g., CRC errors per hour). A user can provide a range at this high limit to control some other activity (i.e., an alarm) through the designation of several values (i.e., 206 and 208) at the single operator limit, but there is no description of operator set high and low limit values that establish the range in which the control solution is free to act when it is afforded sufficient degrees of freedom. In other words, the values in Harrow which according to the Examiner teach the operator set high and low limit values are only pertinent to a single operator limit and an alarm range associated therewith, and not operator set high and low limit values.

As such, Schaefer and Harrow fail to teach or suggest, besides other things, both a first pair of high and low limit elements representative of engineering hard high and low limit values and a second pair of high and low limit elements representative of

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operator set high and low limit values for a corresponding process variable, as recited in each independent claim.

Second, in addition to Schaeffer and Harrow failing to teach or suggest all of the claim limitations as clearly set forth above, there is no teaching or suggestion in either of the references that would motivate one skilled in the art to make a modification to Schaefer using the teachings of Harrow as alleged by the Examiner so as to arrive at the present invention. The Examiner alleges that it would have been obvious to one skilled in the art, having the teachings of Schaeffer and Harrow before them to modify the gauge axis and the graphical shape taught by Schaefer to include the user defining high and low limits of Harrow "in order to enhance users to understand the variable base on graphical indication effectively," as taught by Harrow.

However, as explained above, Harrow does not show user defined operator high and low limits as indicated by the Examiner. If Schaefer was to be modified by the teachings of Harrow, the most that is taught, is the expansion of one of the upper limits such that another activity could be controlled thereby (e.g., an alarm such as described in Harrow).

For example, consider the upper limit number 18 in Figure 1 of Schaefer. If Schaefer was to be modified by Harrow, only another value on line 1 would appear to determine when an alarm condition for the variable associated with the number 18 would exist. In other words, the upper limit 18 would be expanded to provide an alarm range of values extending from the upper limit 18. Contrary to the present invention, Harrow does not show the addition of another set of operator limits within the engineering hard limits that establish the range in which the control solution is free to act when it is afforded sufficient degrees of freedom as described according to the present invention. To allege that the combination of Schaefer and Harrow teach anything more is clearly unsupported by the cited references.

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For at least the above reasons, independent claims 1, 21, 40, 43, 47, and 51 are not obvious in view of the cited references.

With respect to claims 3-5, 7-13, 15-17, 19, 23-25, 27-33, 35-38, 41, 44-46, and 48-50, Applicants respectfully submit that these claims are also patentable as further limitations of respective patentable base independent claims from which they directly or indirectly depend. Furthermore, such claims are each patentable over Schaefer and Harrow based on the subject matter recited respectively therein. For example, the arguments presented in the response to the previous office action are incorporated by reference herein. In addition, for example, various remarks are further provided below with respect to many of such claims that continue to be rejected.

For claims 4 and 24, Applicants respectfully submit that the Examiner continues to fail, besides other things, to show where Harrow or Schaefer teach or suggest a single pair of parallel lines on a gauge axis that represent both an engineering hard high and low limit values and an operator set high and low limit values, as recited in claims 4 and 24. In addition, Applicants respectfully submit that the Examiner has failed to identify a suggestion or a motivation to combine Harrow and Schaefer so as to arrive at the subject matter recited in claims 4 and 24. The Examiner continues to indicate that the references show this single pair of lines, but Applicants cannot understand where in the document such a single pair of parallel lines on a gauge axis represent both an engineering hard high and low limit values and an operator set high and low limit values. Each of the pairs of lines cited by the Examiner from the documents may represent one set of limits in the cited references, but they do not represent both sets of limits.

For claims 5 and 25, Applicants respectfully traverse the rejections. First, the Examiner asserts "Schaefer et al. shows the first pair of parallel lines extending orthogonal to the gauge axis on (column 11, lines 38-64)" and Harrow shows the elements representative of the operator set limits displayed at a shorter length than

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those shown for the engineering hard limits. The Examiner also asserts that it would be inherent for the operator limits to be within the engineering hard limits. Although, the placement of the operator limits may be within the engineering hard limits, it is not inherent that the length of such operator limit elements be shorter than the engineering hard limit elements. Clearly such a relative measurement cannot even be assessed when two different references are being cited for each type of limit elements (e.g., hard engineering elements alleged to be shown by Schaefer and operator limit elements alleged by the Examiner to be shown by Harrow).

For claims 7 and 27, the Examiner asserts Schaefer et al. demonstrates the claimed elements. Applicants respectfully traverse these assertions. There is nothing in the specification that would show the graphical shape positioned adjacent one of the pair of high and low limit elements when the value for the corresponding process variable is within a certain range of the engineering hard high/low limits.

Further, the Examiner indicates that the adjacent position is inherent. A *prima facie* case of inherency can be rebutted by evidence showing that the prior art does not necessarily possess the characteristics of the claimed limitations. Under the principles of inherency, if the prior art, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. See *In re Rijckaert*, 9 F.3d 1531, 1534, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art) (see M.P.E.P §2112).

In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly

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inherent characteristic necessarily flows from the teachings of the applied prior art. (M.P.E.P §2112). It is respectfully submitted that the Examiner has not met the burden of providing a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the cited documents. In other words, Applicant submits that the position of the graphical shape as alleged by the Examiner does not necessarily flow from the teachings of the cited documents; various other positions or manners of showing that the value for the corresponding process variable is within a certain range of the engineering hard high/low limits.

For claims 8 and 28, the Examiner continues to assert "[i]n combination of Schaefer et al. and Harrow et al., they also demonstrates" the subject matter recited in claims 8 and 28 at "(figure 1, 16, column 8, lines 36-59" and "[i]n combination of Schaefer et al. and Harrow et al. (figure 13A), the graphical shape is positioned outside of the parallel lines when the value for the corresponding process variable is outside the high and low process limit values." Applicants continue to respectfully traverse these assertions.

Claims 8 and 28 state in part that the graphical shape is positioned outside of the parallel lines of the second pair of high and low limit elements when the value for the corresponding process variable is outside the operator set high and low process limit values by a predetermined percentage. Column 8, lines 36-59 of Schaefer recites in part that for figure 1, "spokes 1 through 8 radiating from the common origin 0 each represents the scale for one or more process parameters . . . [where] points 9 through 16, which are all a fixed distance from the common origin 0, represent the target or reference value of the associated parameter or parameters." "The actual value of each parameter is also plotted on the associated spoke . . . [where] [p]ositive deviations from the target value are shown at the at points further away form the common origin 0 than

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the reference values and negative deviations are plotted closer to the origin." (Col. 8, lines 44-48). "When an actual value exceeds a limit in either direction, the vertice is plotted at the limit but since . . . the numerical value of the parameter appears on the display, the operator will be aware of the condition." (Emphasis added) (Col. 9, lines 35-39). In addition, Schaefer and Harrow both fail to teach or suggest the "predetermined percentage" element as recited in claims 8 and 28. Thus, Schaefer and Harrow fail to teach or suggest displaying the graphical shape at position outside of the pair of parallel lines when the value for the corresponding process variable is outside the second pair of high and low elements representative of operator set high and low process limit values by at least a predetermined percentage, as recited in claims 8 and 28.

For claims 9 and 29, the Examiner asserts that Schaefer shows such elements in, for example, Figures 5 and 6 and other text. However, the graphical symbol used in Schaefer appears to always be a single short dash. As such, how is this graphical shape capable of representing an optimization characteristic when it is always the same. If the Examiner is referring to the entire polygon shape as being the graphical symbol, this is also inappropriate as the polygon symbol is not representative of an associated process variable, but the state of the system.

For claims 10, 11, 30, 31, 44-45, and 48-49, the Examiner states "Schaefer et al. also shows the graphical user display of claim 9, wherein the graphical symbol is representative of a corresponding process variable to be maximized and the graphical symbol is representative of a corresponding process variable to be maximized (column 17, lines 4-17)." Applicants respectfully traverse these assertions. Column 17, lines 4-17 of Schaefer recite a "flow chart for the iconic program which utilizes the data developed in the preceeding [sic] programs to generate the displays on the visual display units 57 and 58 . . . [where] [i]f the iconic or top level display has not been

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selected for display has not been selected for display on any of the visual display units . . . the remainder of the iconic program is not needed and is therefore not run . . .

[a]ssuming that at least one observer is calling for the top level display, a determination is made in block 101 whether a reactor trip has occurred while the terminate"

Applicants respectfully submit the cited section of Schaefer, or any portion of Schaefer, fails to teach or suggest either a graphical symbol representative of a corresponding process variable to be maximized or to be minimized, as recited in such claims.

The Examiner states that certain variables can be maximized and minimized. However, nothing in Schaefer shows a graphical symbol representative of the variables to be maximized or minimized.

For claims 12, 32, 46, and 50, the Examiner alleges Schaefer discloses the graphical symbol is representative of a corresponding process variable to be held at a resting value at column 13, lines 1-20. Applicant respectfully traverses such assertions and in response asserts that no such graphical symbol provides such a representation.

For claims 13 and 33, the Examiner alleges Schaefer discloses the graphical symbol is representative of a corresponding process variable being constrained to a set point at column 16, lines 25-51. Applicant respectfully traverses such assertions and in response asserts that no such graphical symbol provides such a representation.

For claims 15 and 35, Applicants respectfully traverse the Examiner's assertion that "Schaefer et al. also teaches the graphical shape is a circle positioned along the gauge axis (figure 1, column 9, lines 39-66). Applicants respectfully submit that figure 1 and column 9, lines 39-66 of Schaefer fails to show a graphical shape of a circle positioned along the gauge axis, as recited in claim 15 and 35, but rather shows line segments positioned along the "spokes".

The Examiner has also asserted that Schaefer's failure to teach or suggest the graphical shape of a circle positioned along the gauge axis is not true, as "Schaefer et

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al. teaches the graphical shape is a circle positioned along the gauge axis (figure 1, column 9, lines 39-66)" where "[e]lements 9, 10, 11, 12, 13, 14, 15 and 16 are on the circle". Applicants respectfully traverse these assertions. Elements 9, 10, 11, 12, 13, 14, 15 and 16 identified by the Examiner form a "polygon" (e.g., an octagon in the case of Figure 1), and not a circle (see Schaefer Col. 8, lines 38-44). Thus, Schaefer fails to teach or suggest a graphical shape of a circle positioned along the gauge axis, as recited in claim 15 and 35. Only an imaginary circle that is not graphically displayed has such elements which lie thereon. Further, when the Examiner refers to the entire polygon shape as being the graphical symbol, this is also inappropriate as the polygon symbol is not representative of an associated process variable, but the state of the system.

For claims 19 and 41, the Examiner continues to assert "Harrow et al. discloses a matrix display having the manipulated variables displayed along a first axis thereof and the controlled variables displayed along a second axis thereof, wherein each of the manipulated and controlled variables includes a graphical device displayed in proximity thereto (figure 11B, column 18, lines 16-32)." Applicants respectfully continue to traverse the rejection. Nothing in the references even comes close to showing such a matrix display.

Applicants respectfully submit that Harrow fails to teach the above-recited subject matter of claim 19. Rather, Harrow teaches a "graphic display of data" having Cartesian coordinates defining an independent axis "CRC Errors" and a dependent axis "Time" on which a graphical indication of the CRC errors per hour are plotted (Col. 18, lines 16-32). As such, Harrow, however, does not teach or suggest a matrix display with manipulated variables displayed along a first axis and the controlled variables displayed along a second axis, or a graphical device displayed in proximity to each of the manipulated and controlled variables, as recited in claim 19.

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For claim 38, the Examiner asserts that Harrow, describes such limitations. Applicants respectfully traverse the rejection and submit that Harrow does not teach or suggest displaying a matrix display having manipulated variables displayed along a first axis of the matrix and the controlled variables displayed along a second axis of the matrix. Such arguments have been previously presented.

Based on at least the forgoing reasons, the Final Office Action fails to establish a *prima facie* case of obviousness for the rejection of the pending claims 1, 3-5, 7-13, 15-17, 19, 21, 23-25, 27-33, and 35-38, 40-41, and 43-51. Applicants respectfully request reconsideration and allowance of such claims.

Claims 18, 20, 39, and 42

The Office Action rejected claims 18, 20, 39, and 42 under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 4,675,147 to Schaefer *et al.* (hereinafter "Schaefer") in view of U.S. Patent No. 5,375,199 to Harrow *et al.* (hereinafter "Harrow") and further in view of U.S. Patent No. 5,631,825 to van Weele *et al.* (hereinafter "van Weele"). Applicants respectfully traverse the rejection of each of the claims.

For claims 18, 20, 39, and 42, Applicants respectfully traverse the rejections and repeat the arguments presented above given for the independent claims from which these claims directly or indirectly depend. Such claims are also allowable in view of the limitations thereof.

Applicants respectfully request reconsideration and allowance of claims 18, 20, 39, and 42.

Allowable Subject Matter

Applicants acknowledge the Examiner's indication that claims 14 and 34 are objected to as being dependent on a rejected base claim, but that they would be

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allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Applicants have not rewritten the claims in independent form as it is believed that the claims upon which they depend are also in allowable condition. However, Applicants reserve the right to rewrite such claims at a later date.

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Summary and Request for Examiner Interview Prior to Disposition of Case

It is respectfully submitted that the pending claims are in condition for allowance and notification to that effect is respectfully requested. It would appear that the Examiner does not recognize the differences between Applicants' invention and the cited references. It is requested that the Examiner contact Applicants' Representatives, at the below-listed telephone number, to discuss the prosecution of this application when it is taken up for consideration.

Respectfully submitted for

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CERTIFICATE UNDER 37 CFR §1.8:

The undersigned hereby certifies that this paper is being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Assistant Commissioner for Patents, Washington, D.C. 20231, on this

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